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CHINA: THE FIRST GREAT DIVERGENCE

Collective Learning in Medieval China

1250L

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The story of Medieval China is an example of the power of collective learning to produce rapid advances in human complexity.

BIG HISTORY PROJECT

THE TWO "GREAT DIVERGENCES"

Historians sometimes refer to the Industrial Revolution as the "Great Divergence" where suddenly the energy bonanza of industry catapulted Europe and North America ahead of most of the rest of the world for much of the nineteenth century and the early twentieth century. The increase of population numbers and the rapid increase of connectivity between world zones certainly gave the West an advantage in collective learning and the harnessing of energy flows for quite some time. It was a cultural "Cambrian explosion" where human complexity suddenly burst into many diverse and intricate new forms. What is often forgotten is this was only the "second Great Divergence" of the Common Era (CE). Thanks to collective learning, the "first Great Divergence" of the Common Era happened in China in the tenth and eleventh centuries, giving China a technological edge that lasted several centuries.

Collective learning has two main drivers: population numbers and connectivity. High population numbers are important because they give you a bigger group of potential innovators. The more people you have, the more likely it is that someone is going to innovate on existing knowledge and pass their new knowledge on to the next generation. Connectivity is also important because you need to increase the exchange of information between those potential innovators. If people exchange ideas, it increases the odds that someone is going to "connect the dots" and come up with a breakthrough idea, as well as transmit that idea across a kingdom, a region, or even the world.

THE RAPID GROWTH OF THE CHINESE POPULATION

In the centuries before the Common Era (BCE), China had a lot of advantages in terms of collective learning already. They were already using efficient agricultural methods that would not be used in Europe for many centuries. They used heavy iron plows, seed drills, horse harnesses around the torso rather than the neck allowing them to carry more, careful planting methods, and advanced weeding techniques. This resulted in a larger population of potential innovators. This translated into the Chinese being the first inventors of a lot of technologies. But at this time, the majority of the Chinese population lived in the north, around the Yellow River valley, where the dominant crops were millet and wheat – not rice.

Rice has an advantage over grain products because it can support more people in a given land area. After the harvest, transforming grain into bread products is labor intensive. Preparing rice for human diets is less so. You can also get a lot of rice out of a small plot of land. Per hectare, traditional varieties of rice support 5.63 people compared to wheat supporting 3.67 people. Rice was already present in Southeast Asia for several thousand years, and had moved into south China. Meanwhile, the bulk of the Chinese population in the north continued to farm grains. China is frequently associated with dense populations and rice, but the largest and densest area of China thrived on a grain agriculture until relatively "later" in Chinese history.

In southern China before 200 CE, the yield from wet rice farming was not as high as it could have been. Rice is most efficiently grown in water, but because the Chinese before 200 did not use terracing and rice paddy systems, but grew rice beside streams and in small irrigated plots, the harvest of rice was smaller. "Dry rice farming," meanwhile, was not much more efficient than wheat. This is the reason why northern China held the bulk of the population despite the long history of wet rice farming to the south. After 200, south China began to increasingly use terracing and rice paddies. This allowed higher crop yields, supporting a larger population. At the fall of the Han dynasty in 220, foreign attacks forced more Chinese south to the Yangtze River basin. Intensification of rice farming and the growth of migration to the south continued for several centuries. Gradually, this raised the population.

Collective learning got another boost under the Song dynasty (960-1276). They enacted a set of policies that vastly increased the population during their reign. They introduced better strains of rice into China from Vietnam. They appointed farming experts to spread knowledge of new farming techniques, tools, fertilizers, and irrigation methods. They gave tax breaks to people who were beginning to farm unoccupied land, and gave low-interest loans to them to buy new tools and crops.

The result was a rapid increase in the size of the Chinese population. This was good news for collective learning. By 800, the population of China was around 50 million to 60 million and did not far exceed that number prior to the tenth century. By 1100, the population had grown to an estimated 110 million to 120 million, approximately doubling the number of potential innovators. Meanwhile, China had woodblock printing, allowing for information to be transmitted more reliably to a greater number of innovators. As a result, collective learning leaped forward.

FOUR CENTURIES OF RAPID INNOVATION

This counts as the "first Great Divergence" between East and West in the Common Era. China had a greater number of potential innovators and it is no coincidence the Song dynasty was one of the most technologically advanced and industrially productive societies in pre-modern history. Some scholars say that the Song dynasty came close to having a Modern Revolution of their own.

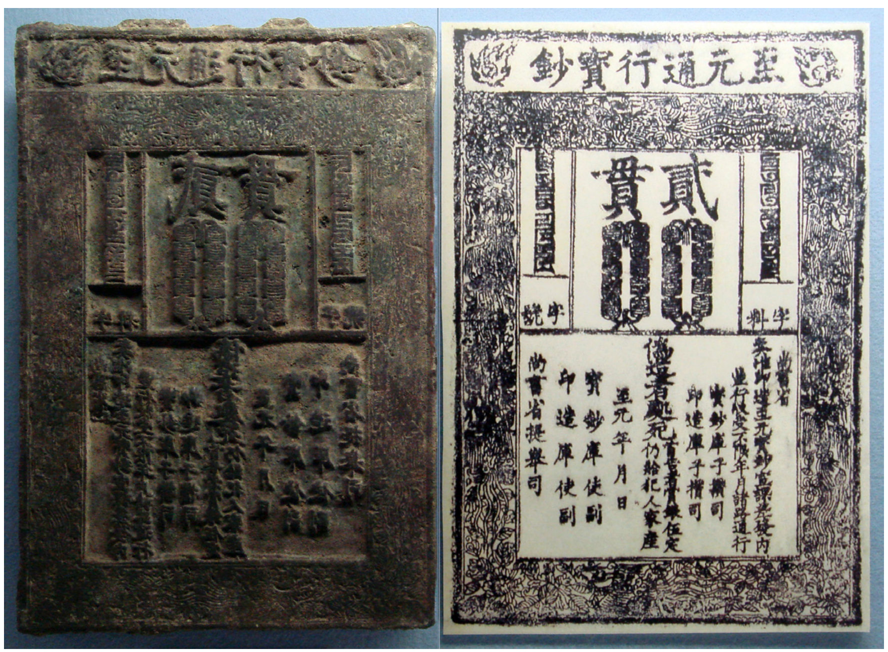
Farming techniques improved: use of manure became more frequent, new strains of seed were spliced and developed, hydraulic and irrigation techniques improved, and farms shifted to crop specialization; all of which are hallmarks of farming in modernity. Coal was used to manufacture iron and iron production increased from 19,000 metric tons per year under the Tang dynasty (618-907) to 113,000 metric tons under the Song dynasty (960-1276); changes that are very similar to those seen in the Industrial Revolution. The minting of coin currency increased by 4,500 percent under the Song dynasty and Song China was the first society to use banknotes. The Song dynasty was also the first to invent and harness the power of gunpowder.

The Song Chinese mechanized textile production almost to a degree that would be seen in Britain centuries later. They invented the magnetic compass to open up greater exploration of the seas and the wider world. They made advances in mathematics, geometry, and cartography. They invented movable type printing four centuries before Gutenberg did in Europe, further increasing the connectivity between potential innovators. All told, China from 900 to 1300 made tremendous advances that rendered it one of the most technologically advanced and wealthiest countries in the world.

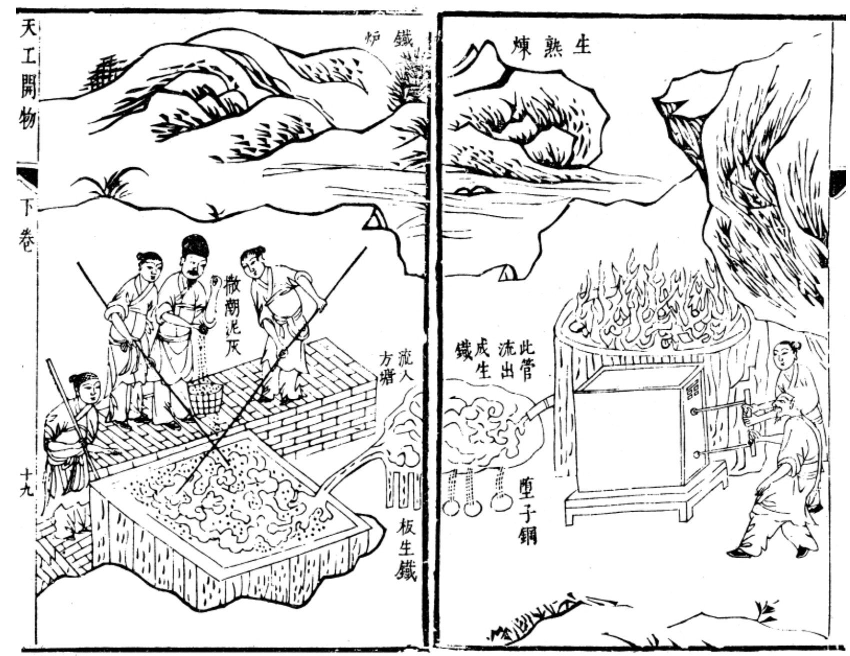
TWO DIVERGENCES COMPARED

The "second Great Divergence" of the Industrial Revolution gave Europe and North America a lead that has lasted a couple of centuries. Some scholars date the point where the West surpassed the East in 1850, others 1800, and a few scholars even as early as 1750, when the Industrial Revolution was first stirring in Britain. However, it would appear that the "first Great Divergence" of the Common Era gave China a massive lead in collective learning and technology that lasted from about 1000 to 1700, or even later. That divergence lasted several centuries before the West overtook it. Now, after 200 to 250 years of the West being in the lead, China is rapidly catching up to it in terms of various hallmarks of modernity, technology, and production.

The rapid advance of Medieval China ahead of the West highlights some of the main drivers of collective learning, one of the most important being the number of potential innovators increasing the odds of a breakthrough. It underlines the fact that now, in a united global system of more than 7 billion people, we stand a high probability of an even more rapid pace of collective learning – and astounding breakthroughs in science



A Yuan dynasty (1271–1368) printing plate and banknote.



Chinese iron workers smelting iron ore to make pig iron and wrought iron in 16th century.

and technology seem to happen every year.

On the other hand, the tremendous advance of collective learning in Medieval China highlights a puzzling question: why did the Industrial Revolution not occur there several centuries before it did in Britain? Were the societal conditions not quite right after the fall of the Song Dynasty? Was China not well connected enough with the other world zones? Or, were a few crucial inventions required to kick-start the Industrial Revolution just not thought of, by pure chance, by the vast numbers of potential innovators in China? Having more brains humming away at a problem can increase the odds of a breakthrough, but it doesn't guarantee one.

As it was, China continued to have a lead in human complexity for quite some time, and its population continued to grow. Crops from the Americas became widespread in China in the 1600s, and land ill-suited for farming rice was given over to yams, maize, potatoes, and American beans. Yet in the eighteenth and nineteenth centuries, when the European population was generally growing thanks to a rapid chain of breakthroughs, China entered a period of famines and population strain. The "second Great Divergence" had begun.

As of now, there are many potential answers as to why the Industrial Revolution occurred when and where it did, sending humanity on new path toward the Anthropocene and unprecedented heights of complexity in the Universe. A better understanding of that mystery might help us better understand where collective learning may take us next.

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